

Appl. No. 10/518,118
Amdt. dated March 30, 2006
Reply to Office Action of January 6, 2006

REMARKS

The application stands rejected under 35 U.S.C. § 112, second paragraph as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention. Amendments have been made to the claims to address the issues presented by the Examiner.

The Examiner raises a question as to how chirality is determined in the amino acid. The compound has an amino group and a carboxylic acid group from the amino acid on each side of the biphenyl group. Clearly, the carbon to which the nitrogen atom is attached is an asymmetric carbon and is a source of optical activity. Also, page 4 of the specification states that this invention differs from those where enantioselectivity was controlled by a single chiral center. This makes it clear that both R groups are used to determine stereochemistry of the molecule.

The process claims have been amended to use the standard claim language term “comprising” as requested by the Examiner. In the specification, a number of process steps are cited in addition to those claimed, making it clear that, at the time of filing, limiting the process to the steps originally cited in claim 10 was not contemplated. The claims were further modified to more closely conform to U.S. practice by grammatically rearranging the wording to specifically point out each process step.

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Claims 10 and 12 have been amended to correct the chemical name of 3,3'-diformyl-2,2-dihydroxy-1,1'phenyl. Support for this correction is found in the specification at page 3. The concentration of chiral catalyst used in an oxidative coupling reaction of claim 14 has been corrected as well, and now reads 1 – 10 mol % as on page 4 of the specification.

Claim 10 has further been amended to reflect that a solution results when a chiral amino acid and sodium acetate are solved in water. This solution provides the antecedent basis necessary for claim 11. Claim 11 further limits the process of claim 10 by specifying how the solution was stirred.

Claim 12 has been rejected for claiming “the weight ratio” where no antecedent basis is provided. This claim has been rewritten using “a weight ratio” to describe the proportion of the reactants. This claim is also further limiting by specifying how the components of step b were added.

As amended, claim 13 now specifies how the components of the catalyst were added to yield a particular ratio of components in the catalyst. An indefinite article was used instead of “the” when referring to “molar ratio”.

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Claim 14 has been amended to more obviously call out the process step. The phrase “can catalyze” has been amended to read “catalyzes” to overcome both the indefiniteness rejection as well as identifying the process step.

Each of the rejections under 35 U.S.C. § 112 has been addressed by these amendments. Applicants therefore suggest that this rejection should be withdrawn.

Claims 1-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,875,718 to Fujita in view of the Liu, et al. publication and Bell, et al. in WP94/03271. Applicants respectfully traverse this rejection since the Examiner has not established a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Second, there must be a reasonable expectation of success. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure.

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In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). Finally, to establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “All words in a claim must be considered in judging the patentability of that claim against the prior art.” In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Regarding product claims 1-9, the catalyst of the present invention contains a biphenyl unit with axial chirality. From the center of the biphenyl unit the molecule is asymmetric since the R group is above the plane of the ring on one side of the biphenyl group and on the other side the R group is below the plane of the ring. Further, the alpha-carbon, the carbon to which each R group is attached, is an asymmetric carbon atom, giving the molecule four diastereoisomers. The prior art does not show an oxidation catalyst with these characteristics.

In the instant application, no *prima facie* case of obviousness has been made since none of the three criteria have been met. First, there is no suggestion in any of the references that compounds of this type having optical activity are obtainable or desirable. None of the examples in either Liu or Fujita have multiple cites of optical activity. The catalysts of Fujita and Bell have only axial chirality. Further, Liu discloses a number of Schiff bases, but none of them include a biphenyl group. There is no teaching or suggestion as to how the compounds of Liu would be modified to form a biphenyl group. The compounds of both Liu and Fujita have different moieties attached to the amino group, and again, there is no teaching or suggestion as to how they would be modified to form the optically active species. It would not be obvious to make an oxidative coupling catalyst be taking an olefin polymerization catalyst of Fujita and modifying it with a system for electroreduction of oxygen or Liu and/or the epoxidation catalyst of Bell. Applicants' respectfully suggest that the Examiner has used hindsight in providing the suggestion or motivation needed to modify the reference.

Secondly, there would be little likelihood of success in creating the compound of the instant invention starting with the information in Liu or Fujita. There is no teaching or suggestion to make the claimed combination in the prior art, except in Applicants' disclosure. There is no suggestion as to how the Examiner would modify the

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catalysts to recreate Applicants' catalyst. Additionally, the both the axial chirality in the biphenol unit and the carbon chiral center in the amino acids are critical to obtaining 2-naphthols with high enantioselectivities at a high stoichiometric yield. This is not taught or suggested in the prior art.

Finally, even if the compounds of Liu and Fujita were modified, there is no teaching or suggestion in either of the references that optically active species could be made. Absent this disclosure, the teachings of these references are not sufficient to render Applicants' application obvious. Thus, none of the criteria for a *prima facie* case of obviousness have been met with respect to claims 1-9, and Applicants' have traversed this rejection.

Claims 10-13 are directed to process claims that require preparing an aqueous solution of a chiral amino acid and sodium acetate. A solution of 3,3'-diformyl-2,2'-dihydroxy-1,1'phenyl is mixed with tetrahydrofuran and ethanol is then blended with the amino acid solution. Finally, these solutions are combined with an aqueous solution of VOSO₄, cooled and stirred. Applicants respectfully traverse this rejection because a *prima facie* case of obviousness has not been established.

Arguments asserted above with respect to the motivation to combine and the likelihood of success are reasserted here. Additionally, at least three elements of

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Applicants invention are not disclosed in the Liu and Fujita references. Neither of the references uses amino acids as the nitrogen source in place of diamines. There is no teaching or suggestion of using 3,3'-diformyl-2,2'-biphenol and THF as the starting materials. Thus, even if the references were modified as the Examiner suggests, Applicants' claims would still not be rendered obvious by these references.

Even if a *prima facie* case of obviousness had been established, it would not render the subject claims obvious. It would not be obvious to combine

Applicants respectfully suggest that in the outstanding Action, the rejections evidence “picking and choosing” features of various references and combining them when there is no suggestion in those references to do so. It is impermissible within the framework of a 35 U.S.C. § 103 rejection to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art. It appears as though the Examiner selected compounds similar to those of interest to Applicants and assumed that they could be modified to make the compounds disclosed in the instant application. Since neither the art nor the Examiner suggests how this modification might be done, it would not be obvious to do so.

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Furthermore, none of the cited prior art references considered the problem faced and solved by the present inventor, that of making a chiral oxidative coupling catalyst that is highly selective for products with optical activity. The problem considered by the inventor must be considered in making a determination as to the obviousness of combining references.

By the above arguments and amendments, Applicants believe that they have complied with all requirements expressly set forth in the pending Office Action. Issuance of a Notice of Allowance on the remaining allowed claims is respectfully requested. Should the Examiner discover there are remaining issues which may be resolved by a telephone interview, she is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,
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